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1967 Thru 1986
APACHE
Lift Systems
Parts and Service Manual

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NOTE: On Page 17 "CURTAIN TAB TAPE" #5390057 is the curtain tape used on all Apache Curtains and #3390015 "LIVING HINGE" is the new hinge that replaces all solid plastic hinge on side and end walls.

Gear Kit #0265009 on Page 18 will completely replace your old Gear Box with all aluminum gears for years of trouble free operation (2) required.

Section 1. 1971 thru 1987 Lift System

War Eagles with this system are the same except for differences in the chain track assembly.

1. OPERATION

The entire lift system and its movement during raising, are shown in Figure 1.

The rear gear box receives the torque of the crank and transfers ~~Each gear box, consisting of two sprockets, drive gear and shaft, actuate the lifting chains~~ it to the front gear box through the connecting tube. Each gear box, consisting of two sprockets, drive gear and shaft, actuate the lifting chains. When raising, the gear box is pushing the chains up. Therefore little if any force is applied to the cable connecting the chain links. In turn, the chain pushes up the inner telescope extrusion to which it is attached. The middle telescope extrusion is free floating first

raising by friction and later by the engagement of the stops.

One characteristic of the gear box is its internal resistance to turning when force is applied against the sprockets. This is why the top does not slide down when force is released from the crank. Therefore when cranking down, we are just allowing the gear box to turn while using the weight of the road cover to actually lower it. Again little force is applied to the chain cables.

In the closed position, the chain ends almost bottom out against the other chain. The important point here is that any foreign object or a link from a broken chain, still in the track, would keep the chains from nesting like this. Generally this condition will show up as a top that will not go all the way down. You pull off the gear box and it still won't go down. Push down on one

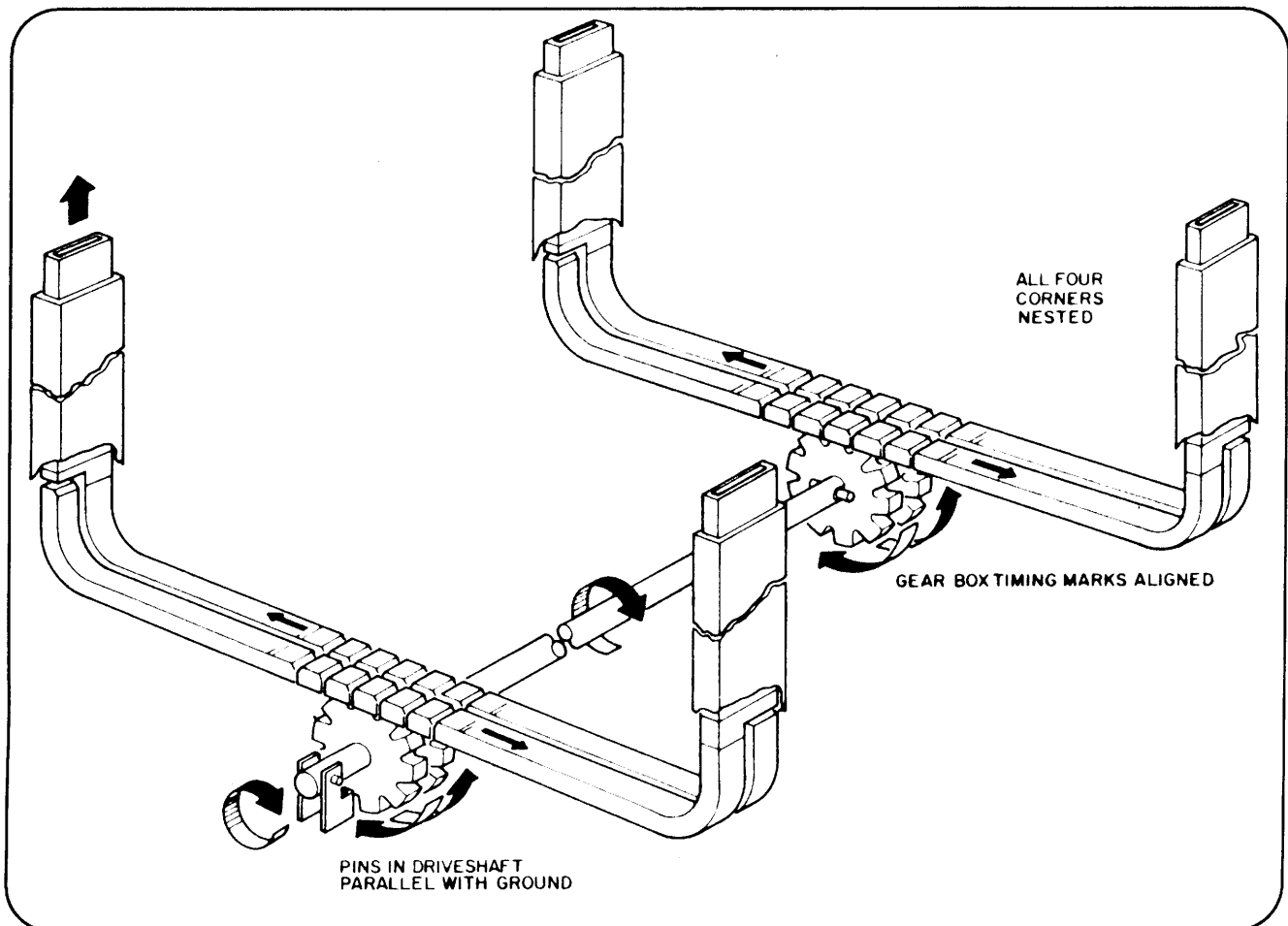


Figure 1. Lift System Operation

corner, the other goes up. Probably something in track. Remove chains and clean out track by pulling something like a rag thru attached to a wire.

2. TIMING

a. GENERAL. The lift system shown in figure 1 is a closed system in time. Essentially it is in time since all corners are down together. This closed position is the reference point to which we can return to resolve timing problems.

b. WHAT IS INCORRECT TIMING? One corner which does not nest with the others is out of time. This is usually a gear or chain problem. One end ahead or behind the other is usually caused by a gear box problem or the connecting tube jumping over the shaft pin.

3. TROUBLESHOOTING

Those problems usually encountered and their possible causes are listed below. Check each cause in the order that it appears. The paragraph number, next to the probable cause, refers to the method for checking that cause.

a. Complete road cover will not raise.

Possible Causes:

1. Rear gear box lock engaged.
2. Gear boxes frozen.
3. Connecting tube jammed.
4. Gear boxes or chains jammed.

b. Front end of road cover will not raise.

Possible Causes:

1. Connecting tube broken or slipping (para.4C).
2. Pin in gear box shaft gone.(para.4D).
3. Broken drive gear or pin in front gear box (para.4D).

c. Rear end of road cover will not raise.

Possible causes:

1. Broken drive gear or pin in rear gear box (para.4D).

d. Road cover does not come all the way down to nest.

Possible causes:

1. Road cover side extrusion catching on body rail.
2. Beds not completely pushed in (road cover end extrusion catching on bed.
3. Gear boxes not in time (para.4D).
- 4.Object in chain track (para.2B).

e. Hard to raise and lower.

Possible causes:

1. Stops binding (para.4B).
2. Connecting tube bent or binding (para.4C).
3. Foreign object in track (para.2B).
4. Dirt in track or track dented.
5. Main sidewall rollers binding in road cover end extrusion track.
6. On 1971 models with metal shims in gear box, shims are wearing into gears.

f. One end out of time.

Possible causes:

1. Connecting tube jumped a turn (para.4C).
2. Cracked drive gear or pin in gear box. (para.4D).

g. One corner out of time.

Possible causes:

1. Chain stretched or not installed properly (para 4A).
2. Gear box not in time. (para4D)
3. Cracked sprocket or stripped drive gear (para.4D).

Note:It is common for the left front corner not to seat down as far as the other corners.

4. CHECKS AND CAUSES.

a. Chain.

Repair procedures are given in para. 6.

1. CHECK. Raise road cover half way and try lifting each corner of the road cover. The cover will normally have about 1" of play. Any more movement would indicate a stretched or broken chain.

2. Possible causes for stretched or broken chain.

A. Excessive binding of stops.

B. Chain cable retainers have slipped on cable.

C. Excessive cranking pressure exerted when something was blocking road cover travel. Often this was created by a timing problem and the person cranking was trying to get the cover all the way up or down.

D. Cables are rusted from age and broke.

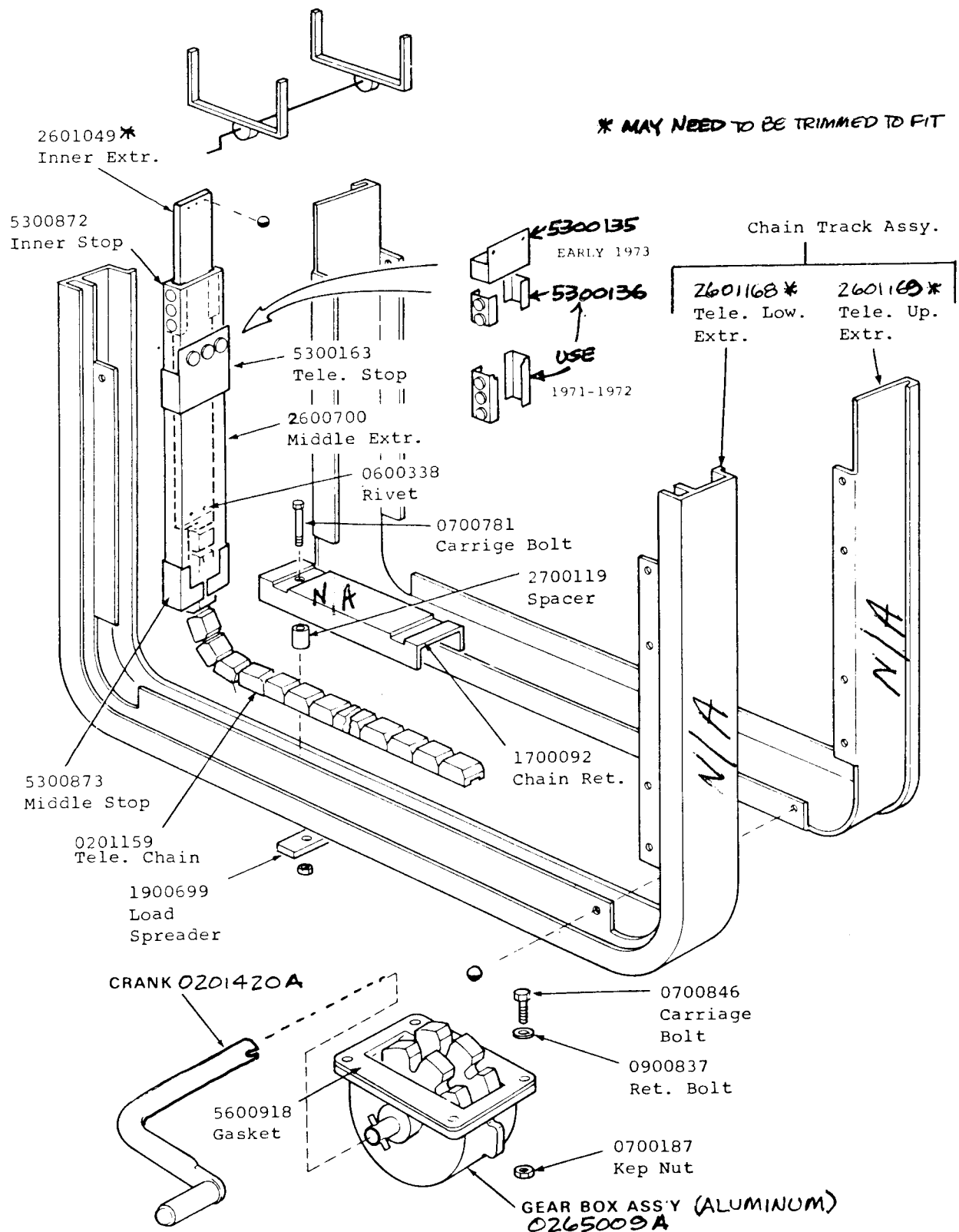


Figure 2. Lift System - Exploded View

b. Stops.

Repair procedure are given in para.6.

1.CHECK. Raise road cover half way and slide middle telescope extrusion up and down. The extrusion should slide up and down without excessive force. Preform this on all four corners. Any difficulty in sliding indicates binding stops.

2.Possible causes for binding stops.

A. Burrs,high spots dents or distortion of the extrusions, chain track, and/or stops.

B. Foreign material (dirt) in chain track or on extrusions and stops.

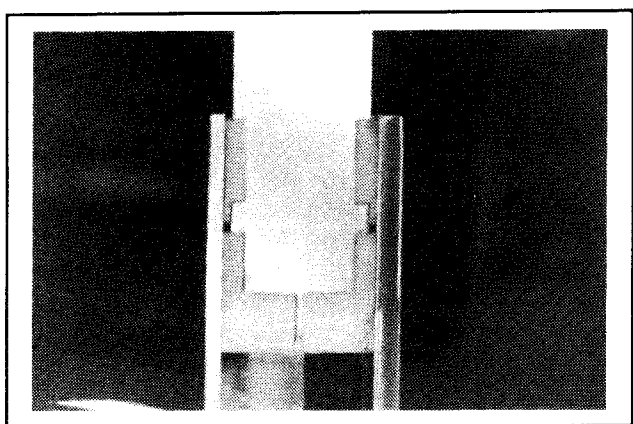


Figure 3. Outer and Middle Stops

c. Connecting tube.

Repair procedures are given in para.6.

1. CHECK. Visually check the condition of the tube including the ends where it connects to the gear boxes. Look for binding through the frame members.

2.Possible causes of tube jumping.

A. Binding stops in front lift system.

B. Damage to tube or on some models, the spring that extends the tube

C. Damaged pin in gear box drive shaft.

D. Cranking down hard when front end of road cover is obstructed. This is possible if bed is not pushed all the way in.

d. Gear box.

Repair procedures are given in para.5.

1. CHECK. With the road cover closed, drop the gear box (para.6a). Inspect the drive gear, pin or dog eared plate, and sprockets for cracks or damaged teeth. Disassemble the gear box (para.6b) to examine the fine teeth between sprockets and drive gear. The size of these smaller teeth was changed in 1977. This of course, changed the cranking ratio and prohibits mixing old and new style gear boxes. Although the plastic gears are no longer available, an aluminum gear kit is. The kit has the larger tooth design so if you have old style boxes you will have to rebuild both ends.

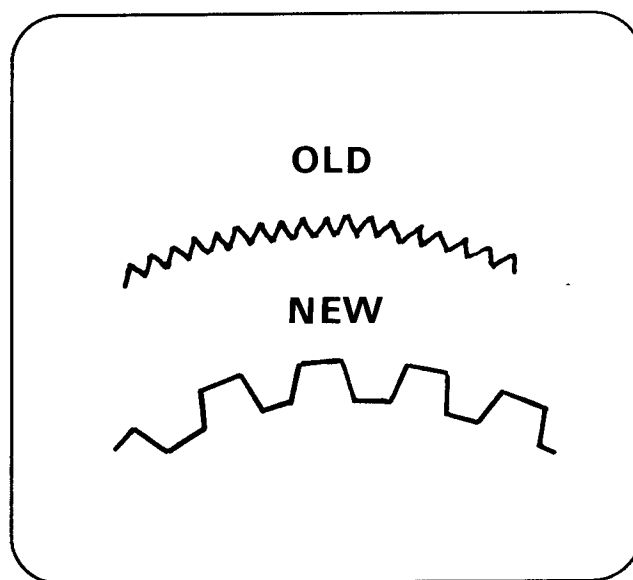


Figure 4. Old and New Style Gears

2. Possible causes of gear box failure.

The causes are generally the same as for chain failures. It just turns out to affect the current weakest part (chain or gear box).

5. GEAR BOX.

a. Removal and installation.

1. Remove three of the screws securing skid plate and turn it out of the way.

2. Remove four nuts securing gear box to bottom of chain track.

3. compress connecting tube and remove gear box.

CAUTION: If gear box is to be removed while road cover is raised, secure sidewalls in raised position to support road cover. Do not drop both gear boxes while in this position without using additional means to steady road cover.

4. Install in reverse order of removal.

b. Repair.

1. **DISASSEMBLY.** The gear box is disassembled by driving out the roll pin from the shaft. Then, remove the four screws nuts and lockwashers holding the two housing halves together. On some models it will be necessary to cut off the rivet holding the lock on the rear gear box. Now the housing halves, sprockets and drive gear will slip off the shaft.

2. **INSPECTION.** Inspect drive gear and sprockets for cracks and/or damages teeth. On the old style small teeth, the gears are not usable if the small teeth are even slightly rounded off. Also check condition of drive gear pin and the groove in the housing that it sets in. If the gear box has metal shims between the sprockets and housing, discard them as they tend to cut into sprocket and thereby make cranking harder.

3. **ASSEMBLY.** Reassemble using the exploded drawing for reference. Make sure that drive gear pin is in groove of housing.

6. CHAIN AND UPPER STOP REPLACEMENT.

a. Removal.

1. Raise road cover and secure sidewall in place.
2. Drill out the three rivets holding the telescope extrusion to the road cover (fig.5). Attach a wire to one of the holes with about 6" of free wire sticking up.
3. Drop gear box (para.5A). Try not to disturb gear box timing so that it'll be easier to reinstall.
4. Push the inner extrusion down into the middle extrusion until it is below the stops (fig.5). Remove the stops (fig.5). Grab the wire and pull the inner extrusion back up and along with it the chain. Continue pulling the chain until it is completely out.

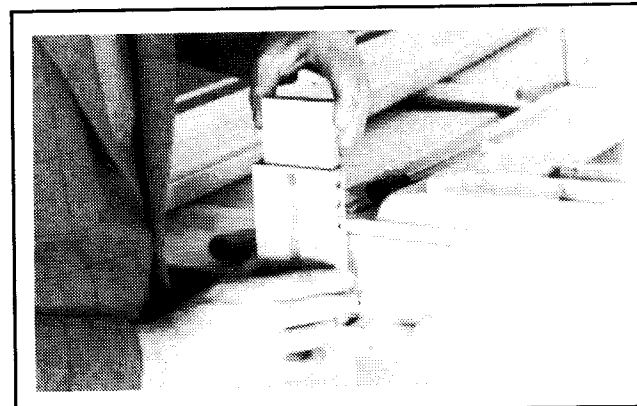
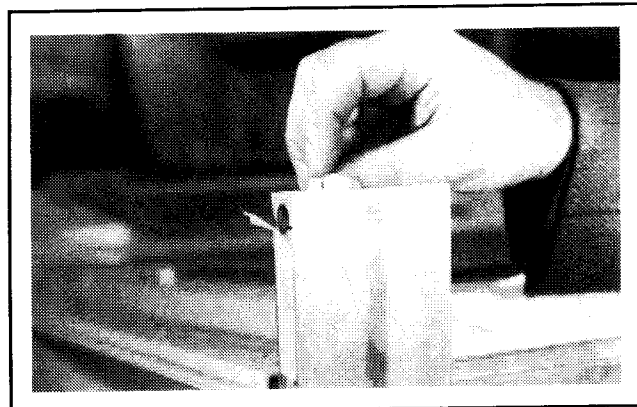
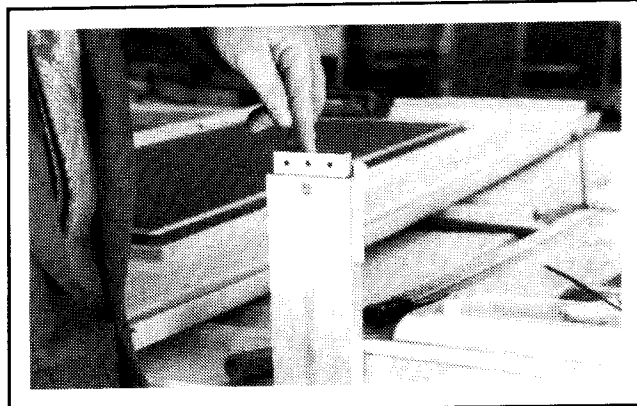
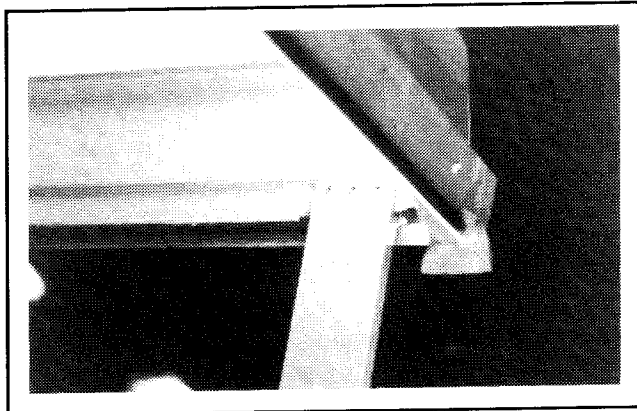


Figure 5 Chain Removal

NOTE:By putting tape over the three buttons of the stops you can more easily keep from dropping them into the track.

5. Remove the rivets securing the chain to the upper extrusion.

6. Inspect the stops for unusual wear. File down any high spots on stops or burrs on the extrusions.

b. Installation.

1. Attach chain to inner extrusion. There is two ways the chain can be attached , only one is right. With the side of the extrusion with three holes facing you, the chain should be on the right hand side with the flat tops of the links facing you.

2. Begin feeding the chain into the middle telescope extrusion. The three holes in the inner extrusion should be facing toward the inside of the trailer with chain teeth facing you and on the left side of the extrusion. When the chain reaches the reinforcing plate at the gear box opening (almost all the way in), it will probably jam against the plate or the bolt holding the plate. A hacksaw blade, inserted through the gear box opening is ideal for guiding the end of the chain past the plate. Of Course, remove the hacksaw blade as soon as the chain is past the end of the plate.

3. Push down the inner telescope extrusion and chain until it is below the middle extrusion and reinstall the stops. Pull the extrusion back up and into bracket on road cover.

4. Connect extrusion to road cover and reinstall gear box.

7 MIDDLE & OUTER STOP REPLACEMENT

NOTE: The chain can be removed with the middle extrusion, if desired. This is accomplished by disconnecting the inner extrusion at the road cover, dropping the gear box and proceeding as outlined below.

a. Remove seal at top of chain track that seals against bed frame. For 1971 and 72 models go on to step "c".

b. Remove two screws securing stop cap to rail and pry up cap to remove. Most caps have three

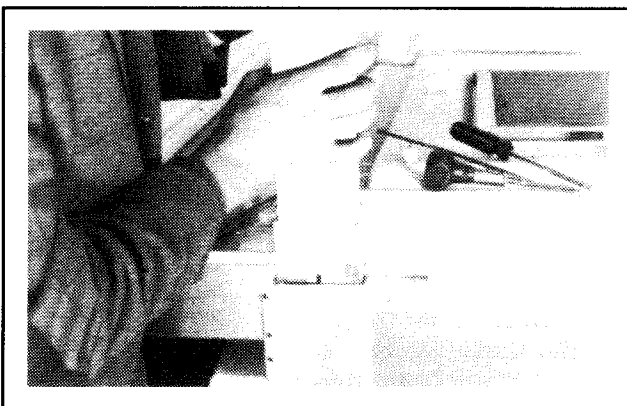
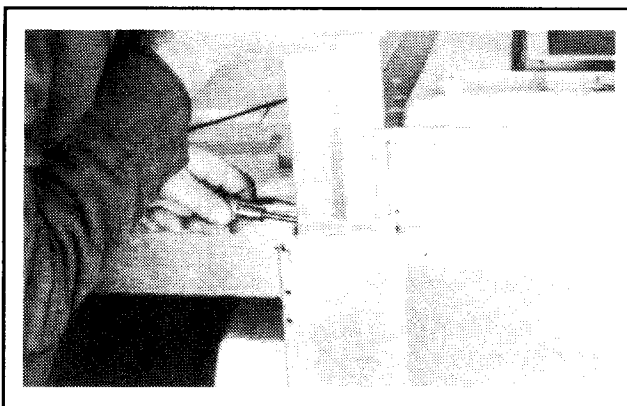
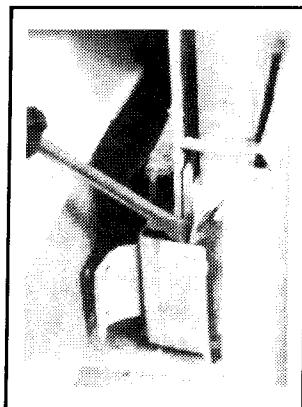
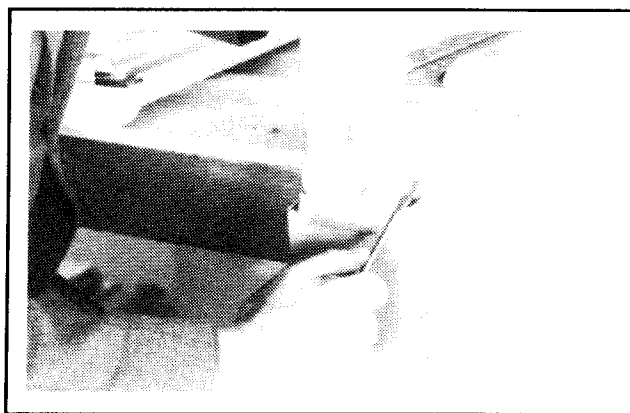


Figure 6. Stop Removal

buttons that engage the rail these must be disengaged with a screwdriver while prying up. For late 1973 and later go on to step "e".

c. Using a screwdriver, pry open the chain track extrusion as shown in fig. 6.

d. Using a pointed tool, pry up on upper stop as shown in fig. 6 and remove. Grasp post, pull forward and pry up on the opposite stop, again fig. 6.

e. Middle telescope extrusion can now be pulled up to expose the lower stops as shown in fig. 6.

f. Inspect stops for unusual wear. Grind down and file smooth any high spots, so that the middle telescope extrusion will move freely up and down when installed back into the chain track.

g. Reinstall in reverse order of removal. Once outer stops are back in place hammer chain track back into original position.

8. CONNECTING TUBE REPLACEMENT.

a. Removal and installation.

1. Remove front gear box (para. 5A).
2. Pull connecting tube forward and out.
3. Install in reverse order of removal.

b. Repair.

Inspect ends of tube for damage. Check condition of slip tube. Make sure tube is not distorted and excessively rubbing on frame.

9. INSTALLING GEAR BOX REBUILD KIT.

Essentially, the same gear box was used on Apaches from 1971 on. The important difference is that in 1977 the gear ratio between the drive gear and sprockets was changed. This change is commonly referred to as old style (71-76 with fine teeth) and new style (1977 and on with coarser teeth). This kit directly replaces the new style. On old style, both gear boxes must be rebuilt to keep the gear ratio the same.

The kit rebuilds one gear box and contains:
Front and rear sprockets

Drive gear
2-Spacers*
Cam and pin*.

*Required for old style boxes only.

1. Remove gear boxes.

With the road cover down, remove the four nuts holding the gear box to the chain track. It will be necessary to remove the skid plate before removing the rear gear box. Remove the box(es).

2. Disassemble gear boxes.

The following procedure will result in the least amount of disassembly and will always leave the rear half of the box on the shaft for proper orientation.

a. On rear gear box (one with lock), drive out the pin that engages the connecting tube between the boxes.

b. Remove the four nuts and bolts holding the box halves together. Slide box half and gears off shaft (the end without pin).

Note: The rear sprocket on old styles will not slide over the cam on the shaft. Use a punch to knock out the pin securing the cam to the shaft, remove cam and sprocket. Discard the cam because you'll use the new one in kit.

c. The front gear box does not have a front pin so just repeat step b for the front box.

3. REASSEMBLY OF GEAR BOXES.

IMPORTANT: Liberally apply grease (wheel bearing type is fine) to all surfaces of the cam, shaft, and small teeth of gears. **DO NOT grease the large teeth that engage the chain.** (See page 8)

a. Install rear sprocket (one with small teeth pointing inward) on shaft and against box half. The small teeth should be facing the open end of the shaft and one of the large teeth pointing straight up.

b. On old style boxes, slide spacer on shaft and install new cam with pin.

c. Install drive gear on cam so that it engages with the sprocket already installed and pin is seated in recess of box half.

d. Install remaining sprocket so that it engages fully with drive gear and making sure one large tooth is pointing up. On old style, install spacer between sprocket and shaft.

e. Slide front box half on shaft, make sure all parts align, and bolt halves back together.

Reinstall connecting tube pin in rear gear box shaft.

4. INSTALL GEAR BOXES.

- a. Install rear gear box. Look up into hole that sprockets go into and note the positions of the chains. Rotate shaft on gear box until sprockets will match with chain. Install gear box and secure with nuts. Reinstall skid plate. Engage connecting tube on front of rear box shaft.
- b. Install front gear box. Again rotate shaft to align sprockets and chain. Here however, the pin in the rear of the shaft must align with the slot of the connecting tube. It may be necessary to rotate the tube a little to get a match.

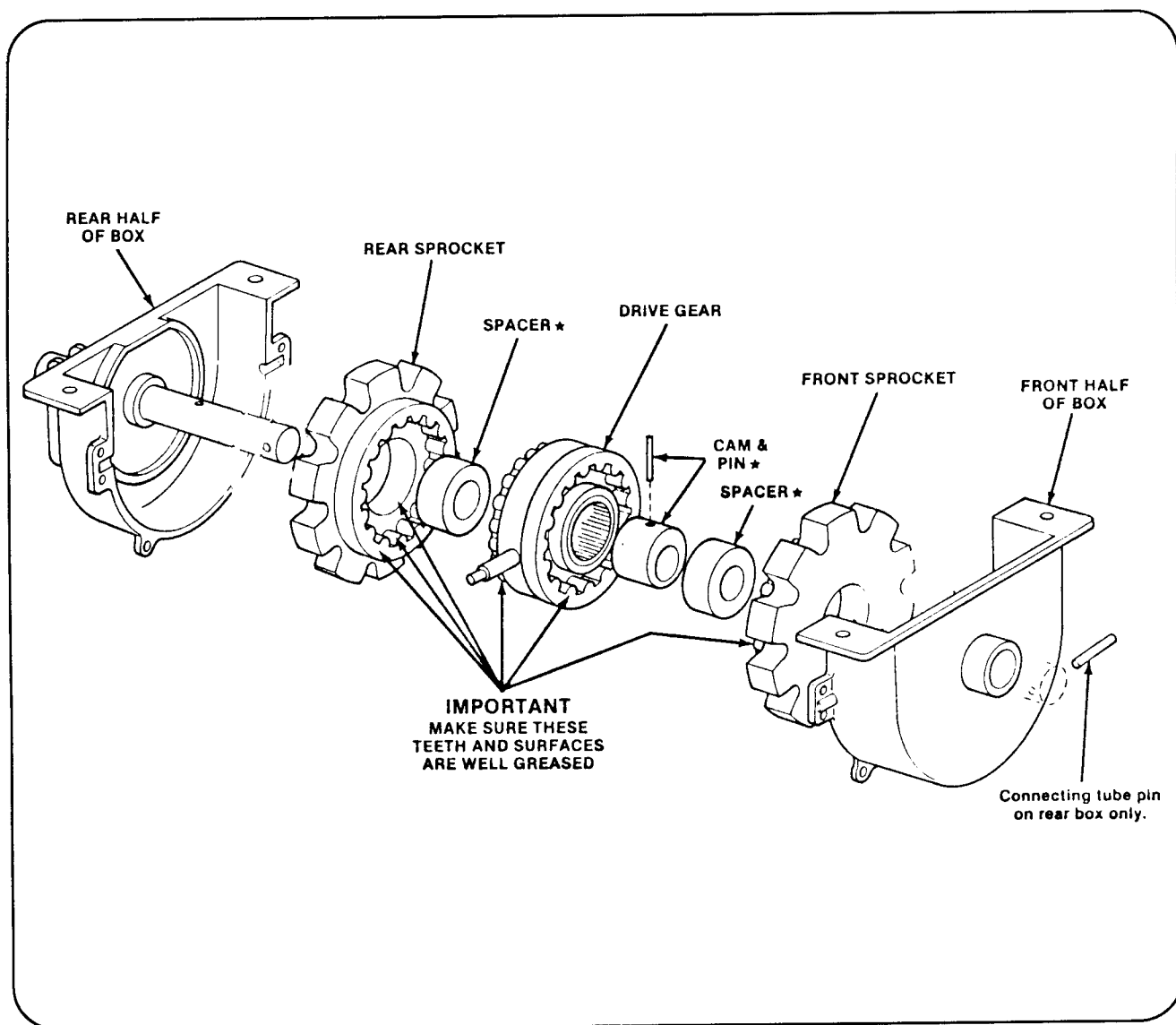


Figure 7. Gear Box Assembly (1971-1987)